THE Cane Growers' QUARTERLY BULLETIN

VOL. XX., No. 3 1 JANUARY, 1957

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

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SUGAR EXPERIMENT STATIONS
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The

Cane Growers' Quarterly Bulletin

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N.Co.310 in Bundaberg Area

By N. McD. Smith

The variety N.Co.310 was grown as a seedling in Natal, South Africa, from fuzz imported into the country from the sugar cane breeding station at Coimbatore, India. Extension of the cane seems to have been fairly rapid, for a recent report states that 50 per cent. of the current crop is N.Co.310, and plantings appear to be on the increase.

Although selected in a 37.5 inch rainfall country, the cane was primarily a better-class-land type. Its reputation for high sugar content was responsible for its introduction into Queensland, the first field plot in Bundaberg being planted in spring, 1948. Stick tests the following year confirmed Natal experience, and propagation was pushed ahead to fill the need for an early sugar value type in the southern area.

By 1951, plots were well distributed on all soil types, so that the reactions to the severe drought and frost conditions of that year were accurately assessed. The conclusions from such an adverse winter had a profound effect on increased plantings for the cane on frosty alluvial sites.

Description:

N.Co.310 is a thinnish stalked, erect cane with a whitish rind showing plentiful waxy bloom. Trash is very clinging; eyes are medium sized; stooling is heavy and compact; germination and ratooning are good. In this regard, planting material must be immature, otherwise a slow and sometimes indifferent strike will occur.

One of the worst features of the variety is early arrowing, which precludes it as a spring plant on dry poor class lands. On such lands autumn plant is the most satisfactory, for stalk length is reasonable at time of harvest. As the crop is cut during the early part of the season, the succeeding ratoons have a chance to make cane before arrowing about May the following year.

On lands of higher production, the problem of arrowing is still a major one, but is compensated for by good sugar returns per ton of cane.

Resistance to Diseases:

The variety is highly susceptible to mosaic, ratoon stunting disease and chlorotic streak. Yield losses have been determined for two of these diseases and indicate, on Natal experience, a 40 per cent. depression of cane yield from the planting of mosaic diseased setts. In regard to ratoon stunting disease, trials in Queensland have shown a 15 per cent. loss in cane yield.

Reaction to Fiji disease is quoted as

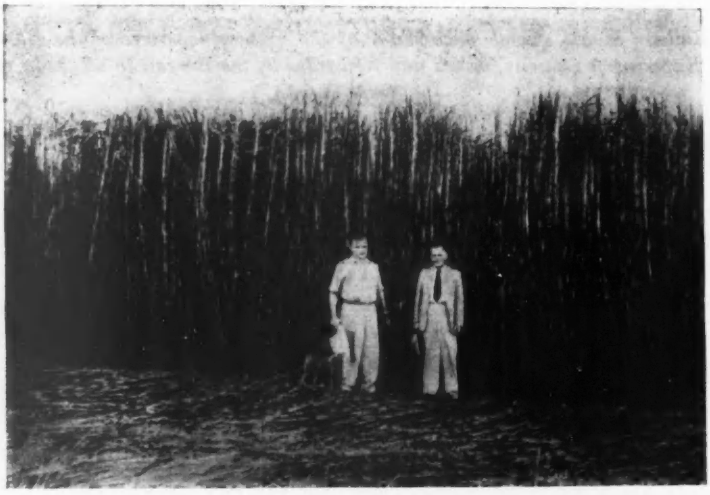

Fig. 42—A crop of N.Co.310 being harvested in the Bundaberg District.

intermediate and the variety is highly resistant to red rot and downy mildew.

Response to the heat curative treatment for ratoon stunting disease is excellent, and germinations are assured at recommended time/temperature levels.

Sugar Value:

Although referred to as an early c.c.s. cane, the accompanying graph shows it quite clearly as a mid-season type. The weekly c.c.s. figures from the five Bundaberg mills and individual N.Co. 310 tests each week were averaged.

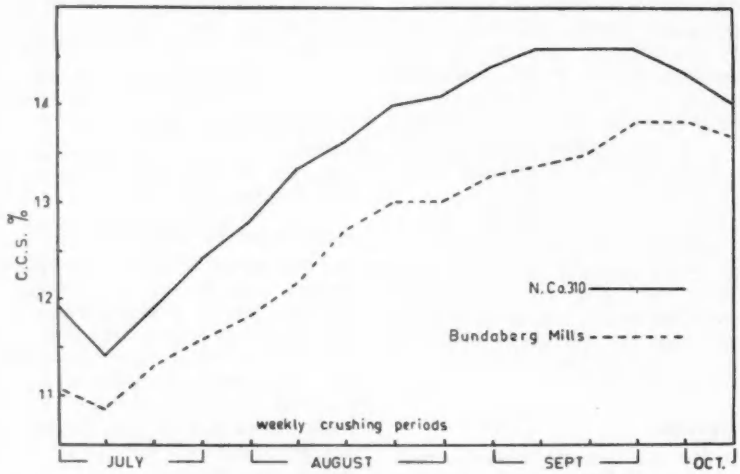

Fig. 43—This graph compares the weekly c.c.s. for the five Bundaberg mills with the weekly figures for N.Co.310.

It will be seen that the variety has maintained a clear lead which, of course, would be actually exceeded in individual cases. The curve of the graph confirmed previous small mill tests which indicated a quick rise in c.c.s. after early August to a peak in September, a flattening off until October and a slow fall during November.

It will therefore be appreciated from a study of the curve and a knowledge of the variety's outstanding resistance to deterioration after "killing" frosts, that growers on certain farms have been advised to plant up to one-third of their properties with this variety. An early awareness to the cane's potential was responsible for up to 70 per cent. of plantings on some farms at Wallaville and Tegege. Such a large proportion to one variety is not normally considered to be good farming practice, but a recurrence of the 1946 and 1951 conditions may confirm the wisdom of these decisions.

One point about the early harvest of N.Co.310 is unfavourable: as mentioned previously trash is very clinging and foliage remains green through winter, resulting in poor burns. The trouble can be minimised by starting in stand-over fields or early-cut old Pindar or Q.50 ratoons.

A return from one farm is worth quoting to show the value of the cane during the season. This particular property is irrigated and consists of reddish forest loam. Of the 1956 crop of 1,250 tons, N.Co.310 comprised 657 tons and, from the commencement of the crushing until September, the c.c.s. averaged 15.1 with the highest individual test of 17.1 during September.

Fig. 44—Mr. C. F. Pollock, plantation manager of Tongaat Sugar Co. of Natal, visits the Pathology Farm at Eight Mile Plains.

A New Variety — Q.61

By C. L. TOOHEY

The "Forecast of Approved Varieties" for 1957 which appeared in the October issue of this Bulletin, listed a new addition for the Bundaberg, Gin Gin, Childers and Nambour district mills. The variety was Q.61. Propagation of stocks for introduction as a new "Q" cane have been extensive, particularly in the Bundaberg-Childers district. Some comments on past performances in trials, its characteristics, and the possible future of the variety may therefore be not inappropriate at this juncture.

Fig. 45—A mature crop of Q.61. This variety has recently been added to the Approved Lists in South Queensland.

Q.61 commenced its climb to recognition when it was selected as a promising cane, H.6, in September, 1947, from a batch of original seedlings planted in the previous year. Its brix of 23.2—standard Q.49 21.3—together with other favourable characteristics largely contributed towards its selection for further trial. The cane seed which produced H.6 was obtained by crossing the varieties P.O.J.2878 and Co.290, a cross which incidentally is perhaps the most prolific producer of our "Q" varieties.

At the end of that September, H.6 with other selections was planted in a yield observation trial on the Southern Experiment Station. In August, 1948, as a result of good growth characteristics and a superior sugar content to the standard C.P.29/116, the variety was selected for trial on properties outside the Station.

The results for that trial over a plant and two ratoon crops make interesting reading and appear in Table I.

TABLE I

	Plant (1949)		1st Ratoon (1950)		2nd Ratoon (1951)		TOTAL	
	TCPA	TSPA	TCPA	TSPA	TCPA	TSPA	TCPA	TSPA
H.6	24.82	4.443	36.34	6.069	22.16	2.701	83.320	14.213
Q.49 (Standard)	20.83	3.520	35.46	4.929	20.83	3.687	77.120	12.136

In 1951 a further randomised trial incorporating H.6 and other promising seedlings was planted with the standard Q.47 on a red forest sandy clay loam. The results of three crops for this trial are given in Table II.

TABLE II

	Plant (1952)		1st Ratoon (1953)		2nd Ratoon (1954)		TOTAL	
	TCPA	TSPA	TCPA	TSPA	TCPA	TSPA	TCPA	TSPA
H.6	43.54	7.31	37.58	5.35	40.05	5.81	121.170	18.47
Q.47	38.93	6.06	30.59	4.40	35.55	5.05	105.070	15.51

Mainly as a result of these trials widespread propagation was undertaken with a view to building up planting stocks. At the same time these plantings on district farms were kept under close observation—notes on growth, habit, field characteristics and sugar content as compared with district standards being made. Some c.c.s. figures from a red volcanic loam farm are quoted in Table III.

TABLE III

c.c.s. (small mill test)

Planted 7/5/55	3/7/56	1/8/56	5/9/56	3/10/56
Q.47	10.20	11.35	13.70	15.00
Q.49	9.20	10.50	13.60	15.30
Q.50	10.05	12.30	15.10	16.80
C.P.29/116 ..	10.00	11.10	14.20	14.90
Q.61	11.20	13.05	15.80	16.80

Thus through trials and propagation plots, a complete picture of the variety under all conditions and on all soil types was built up. By April, 1955, when H.6 was given the number Q.61 and approved for general distribution, the following facts about the new release could be stated authoritively.

Q.61 showed itself to be a quick and reliable germinator. Growth is very erect and vigorous with no tendency to sprawl. Arrowing is not so pronounced as in Q.47, a standard with which it is mostly compared, while sugar content as indicated by the figures quoted in Table III is superior to and earlier than not only that variety, but also Q.49, C.P.29/116 and comparable with Q.50.

Trash of Q.61 is rather clinging, a factor which undoubtedly contributes towards the variety's moderate frost resistance. Q.61 has shown its ability to ratoon well at all times, and blocks cut very early in the season to provide planting material have ratooned equally as vigorously as those cut in the warmer months of the year. The cane has shown tolerable drought resistance and produced good crops on some of the drier soils of the district. On the alluvials and under irrigation the variety has produced heavier crops with no record of lodging.

The Ditch You Can Carry*

By CHARLES J. KNAPP

Ever see two men carry a ditch? The pair pictured on this page are doing just that—carrying 100 feet of irrigation "ditch".

For many reasons this "ditch" is a lot better than a trench in the earth. It's a lot cheaper, too, in the long run. The 100 feet of "ditch" in the picture is made of polyvinyl chloride, rolls up like a garden hose, and is no burden at all for the men—it weighs only 58 pounds!

In 1955 the market in this country for applications of plastic pipe and tubing in business, industry and agriculture climbed to $45 million. Experts estimate the figure will reach $85 million by 1960. This highly-manoeuvrable irrigation pipe is an excellent example of one of the new plastic products which are contributing to this rapidly-expanding market.

Just what goes into the flexible, wearable pipe is a secret Trinity Products Incorporated of Trinity and Houston, Tex., doesn't pass out on match covers. The company points out, however, that several hundred polyvinyl chloride formulations were tried before it felt the product had the tensile strength, weather-ability and general toughness necessary to withstand the repeated rigors of numerous growing seasons.

Fig. 46—One hundred feet of the new plastic ditch being laid in position.

*Reprinted from Monsanto Magazine, June-July, 1956.

The first "Flex-Flume," as Trinity Products calls its plastic ditch, went into the fields three years ago. Today about a million feet of it carry water to thirsty crops across the nation. Laboratory and field tests have proved the product even better than the manufacturer hoped. As a result, Trinity Products ties a three-year warranty tag to every length of pipe sold. But with reasonable care, officers of the company state, a farmer should get as much as 10 years of service from his "Flex-Flume."

irrigation? A Louisiana farmer, using the pipe for the third season, points out that it saves time and expense in grading fields. Land irrigated from open ditches must be graded from field to field, ditch to ditch. With plastic pipe the fields need be graded in only one direction—with the natural slope of the land.

The product's portability and storability are popular appeals. It can be unrolled across fields, through culverts, and across the natural contours of the land. It goes around corners naturally,

Fig. 47—The plastic ditch in operation. Note attached take-off pipes watering individual rows.

The pipe is manufactured in two types: transmission and distribution. The transmission pipe has been used to transport water to crops as far as a mile away from the water source. The distribution lengths have small outlet tubes electronically bonded to the main tube at standardized intervals to fit various crop rows. Each outlet tube has a special tie-off to control rate of flow and amount of water to the row it irrigates.

For the farmer, "Flex-Flume" is a do-it-yourself proposition. With simplified, non-leak couplings, the pipe is easily and quickly installed, uncoupled, moved or stored.

What are some of the advantages of this pipe over other methods of

without special tee or ell fittings; it can be moved from field to field by the simple process of hand rolling or by a tractor-powered reeling device involving a minimum of labour and expense. No special care is needed for storage. It can be rolled up and tucked into barn or shed, or merely covered with canvas and forgotten—it won't rust, rot, mildew or corrode.

In Arizona, where water is at a premium, users are pleased because there is negligible loss from either seepage or evaporation. Losses from these two factors run 20 per cent. in some open ditch areas; as high as 40 per cent. in others.

Tests show that there is even a saving for the farmer in pumping costs

when using the plastic pipe. Because of the smooth texture of the pipe interior and its gentle curves rather than the angular fittings found in rigid types of irrigation pipe, less pressure is needed to force a given amount of water through the tube. Also eliminated is the weed problem usually present in open-ditch irrigation. Weeds, if allowed

Fig. 48—Bending the plastic ditch.

to mature, drop their seeds into the open waters, which, in turn, carry them to the crop rows. Elimination of ditches, too, makes more land available for cultivation. Liquid or soluble fertilizers are easily distributed and controlled by use of plastic pipe, with no harmful effects on the tubing.

"Flex-Flume" has performed admirably in a variety of climates without ill effect on either its quality or its function. It has been used successfully in early spring near-freezing temperatures of the Texas Panhandle as well as the 110° F. midsummer heat of California desert areas.

In field demonstrations, Trinity Products representatives think nothing of running a truck down the length of their water-filled pipe. However, this is merely to show that the pipe will survive if it's run over accidentally. Actually, the company suggests the farmer use reasonable care with his plastic ditch. There is no need to run over it. It can be quickly uncoupled to make gateways into fields for cultivating equipment.

If, for any reason, a length of the plastic pipe gets damaged or torn, there is no need for the farmer to discard it or haul it to town for costly repairs. It can be fixed by the farmer himself—in the field—easily, quickly and cheaply, with a special repair kit.

Trinity Products heads see a bright future for their comparatively new irrigation tubing. The million feet now in use, according to the sales staff, is a mere drop in the dry bucket of parched farmlands. There are 15 million acres of surface-irrigated lands in the West alone, of which probably 80 per cent. is a potential market for "Flex-Flume". There are other vast areas in the nation, too, that offer potential markets.

And there are foreign markets. Already the company has established sales distribution facilities in Australia, India and Pakistan; Peru, Chile and France will soon join the list. In fact, Trinity Products Incorporated hopes, in the not-too-distant future, to tote "the ditch you can carry" 'round the globe.

CONTROLLING THE COMMON REED

The common reed (*Phragmites communis*) is a pest of low-lying areas in the Maroochy district and, over several years, various weedicides have been tested for their efficiency in establishing a control. Some success was achieved with a spray containing 2,4-D and 2,4,5-T, but the Bureau is interested at the moment in some experiments with Dalapon and maleic hydrazide. Dalapon is one of the newer weedicides and it has been reported from overseas as being effective in controlling common reed there. Used at 30 lb. per acre in our trials the material has killed all above ground portions of the plant, but it remains to be seen whether the below-ground portions of this persistent plant have been similarly affected.

Ten Years of Grub Control

By NORMAN J. KING

The year 1956 marks the tenth anniversary of the first experiment in Queensland which gave hope of the long-searched-for control of the greyback cane grub. In 1945 the Bureau, in furtherance of its policy of testing any new insecticides against this serious pest, planted on Meringa Experiment Station a small field trial in which three short rows of the variety Badila were treated with the small quantity of benzene hexachloride (BHC) which was available. This was the first time BHC had ever been applied to soil in the Queensland sugar belt. The results were spectacular and the photograph reproduced here shows this small planting in 1946 when the cane was some fifteen months old. During the next year or so—as larger quantities of the BHC were obtained by the Bureau—many field trials were instituted under a wide range of conditions and on a variety of soil types to define correct rates and modes of application. It was thus that the application rate of 150 lb. per acre of 10 per cent. dust was arrived at, and the only change made since that time has been to halve the rate and double the strength of the dust.

Fig. 49—The first BHC versus greyback grub experiment as it appeared in Spring, 1946. This photograph was taken on Meringa Station.

The effectiveness and absolute reliability of the control were such that within a very short time all greyback-grub affected land was being treated, and by 1954 the area being treated annually had risen to 60,372 acres.

Many new growers who have entered the industry since 1946, and many farmers' sons who are now assuming cane growing responsibilities, have no conception of the crop damage which used to occur in bad greyback years.

As a mark of appreciation of the work performed by the Bureau's entomologists in discovering this control measure the Queensland Cane Growers' Council presented a bronze plaque to the Bureau this year on behalf of the cane growers of the State. A photograph of the plaque appears on the next page and the plaque itself is to be erected in the grounds of the Meringa Sugar Experiment Station where the original research work was conducted.

The control of the greyback grub is one of the outstanding examples in Australia of victory over a major insect pest. Records show that, prior to the use of BHC, cane losses from grub damage were as high as 105,000 tons

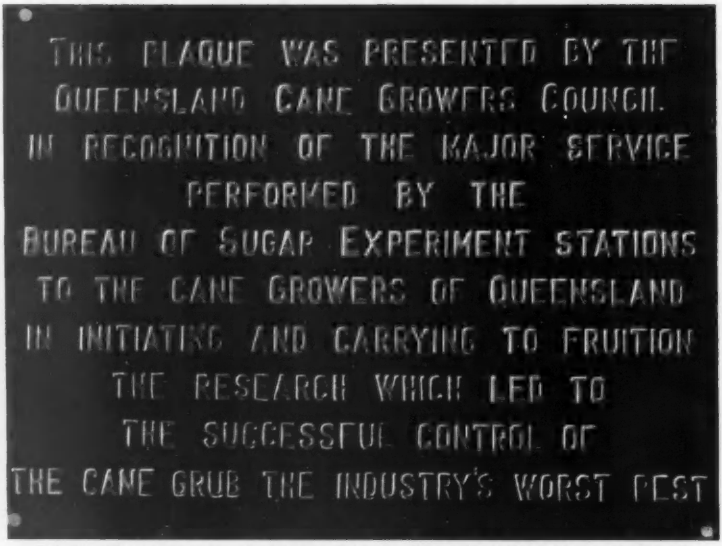

Fig. 50—The plaque recently presented by the Queensland Cane Growers' Council.

in 1946. At present day cane values that loss would represent approximately £400,000, and that does not include the undetected losses of a few tons per acre where grub populations were not sufficiently high to cause yellowing and distress in the crops. The figure quoted is therefore a conservative one, and affords a striking example of the dividends payable by investment in industry research.

Urea versus Sulphate of Ammonia

Urea is a commonly used nitrogenous fertilizer in many parts of the world, but in the Queensland sugar industry it is practically unknown. Although its value and its advantages have been recognised for a long time its general application as a plant food was delayed because of its cost compared with sulphate of ammonia or nitrate of soda. To-day the position is very different, and urea could become a serious competitor in the field of nitrogenous fertilizers.

In five trials conducted by the Bureau in the sugar belt during 1955-56, there were no significant differences between the crops fertilized with urea and sulphate of ammonia, either in cane yield or in sugar per acre. Storage trials were also favourable, and the urea carried through the wet season in very good condition.

Australia is lagging somewhat in the use of new, more-concentrated fertilizers. Other sugar industries are making considerable use of such fertilizers as ammonium phosphate and urea. Urea contains 44 per cent. of nitrogen compared with 20 to 21 per cent. in sulphate of ammonia. If it is sold at an equivalent unit nitrogen price, there is a saving in transport, application and storage costs; and it is claimed to be superior to sulphate of ammonia for aerial fertilizing where the fertilizer is likely to lodge on the leaves of the plant.

Bundaberg's Favourable Seasons

By NORMAN J. KING

The accompanying diagram shows the total rainfall which has been recorded each year at the Bundaberg Sugar Experiment Station since its founding in 1914. For the 42 years of the records the average annual rainfall amounts to 44.5 inches, but one is struck by the succession of above-average years in recent times.

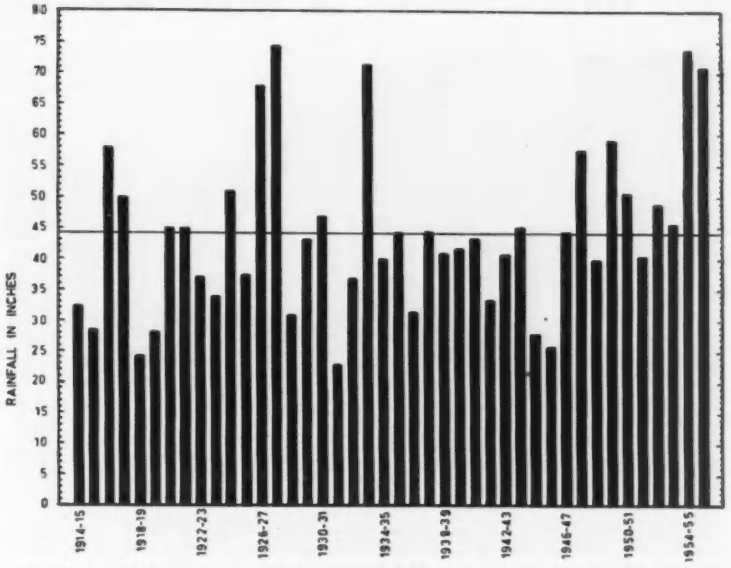

Fig. 51—Illustrating the annual rainfall at Bundaberg Experiment Station since 1914-15. The horizontal line represents the average annual rainfall.

In the entire 42-year period there have been only 14 years in which the July to June rainfall has exceeded 45 inches, but *seven of these occasions have occurred since* 1946-47.

Such a run of good seasons cannot possibly continue and there will be, sooner or later, a return to the periodic dry years and occasional drought years which characterise the Bundaberg district. Prior to 1946-47 one year in three had a rainfall below 35 inches. There were six years when it was less than 30 inches and three when it was below 25 inches.

The succession of above-average years came at a time when rapid expansion of production was needed to fill the export quota, and when new settlers were finding their feet in the industry.

The Bundaberg sugar economy is peculiarly sensitive to dry years since its *average* rainfall is barely sufficient to ensure crops of peak proportions. In addition to the dry year there is generally the one in which frost damage is severe.

There can be no return to the very poor crops of the late twenties and early thirties. Irrespective of seasons the cane varieties are so improved that a disaster such as that of 1932 cannot recur. Disease and drought resistant canes are now grown universally and irrigation is practised on a wide scale.

Fiji Disease Resistance Trials

By C. G. HUGHES

Although it is hoped that within a year or two Fiji disease will have disappeared from the commercial cane fields of the State, the trials in which the advanced seedlings and the newer importations are tested for resistance to the disease, are still an important part of the work of the Pathology Division. Experience with other diseases, as for example downy mildew, which, after an apparent absence of six years was found again last summer on one farm in the Bundaberg area, has shown on the one hand that cane diseases can be eradicated, and on the other, that the process of eradication can be attended by inexplicable minor outbreaks of the diseases. It is imperative, therefore, with Fiji disease, which is still present in very small amounts at Rocky Point and has occurred within the last few years in other South Queensland areas, that the reactions to the disease should be known of all varieties due for commercial propagation. It would be taking undue risks if, due to ignorance of the reaction of new canes, the approved lists of any southern district were stacked with susceptible varieties. It is a costly business combating a disease such as Fiji, as many Maryborough, Moreton and Bundaberg farmers will attest, and, until the disease has gone for good from every district, resistant or near resistant varieties must be available.

Fig. 52—Fiji disease resistance trial at the Pathology Farm. The rows of the test varieties are ratooning while the harbourage rows to preserve the insect vectors are still standing.

Fiji disease is confined to the western areas of the Pacific Ocean and takes its name from the islands from where it was first reported. It is one of the important diseases which are considered by all cane countries when drafting quarantine regulations. Hawaii, where the disease has never occurred, is particularly alive to the danger especially since that country has become such a busy centre of air

traffic. Precautions taken by the scientists of the Hawaiian Sugar Planters' Association include a close watch on and fumigation of, all planes coming to the islands from other parts of the Pacific, and the conduct of trials in Fiji with the co-operation of the Colonial Sugar Refining Coy., so that they will know at all times the resistance or susceptibility of the current commercial or near-commercial canes.

There are two general methods for testing the reaction of varieties to Fiji disease. One is to observe their behaviour in commercial plantings in the presence of the disease, and the second is by isolated controlled trials in which the varieties under test are compared with varieties of known field behaviour. The first method is obviously impossible at the present time in Queensland, and is only applicable when the disease is widespread through commercial crops. A development from this mass observation was the establishment of trials on cane farms but they are also now out of the question in Queensland: the last was concluded at Beenleigh some six years ago. The trial which is isolated from commercial cane is the only type now possible in this State and for the convenience of working, all resistance trials, including those for Fiji, are now planted at the Pathology Farm, Warrigal Road, Eight Mile Plains.

The performance of the varieties of known reaction used as standards in the Fiji trials have come down to us from either commercial cultivation when the disease was prevalent, or else from inclusion in a long series of trials. The standards at present used are C.P. 29/116, H.32–8560, M.1900S. and P.O.J. 2878, which give a range of various degrees of susceptibility.

Fiji disease is transmitted in Queensland by the sugar-cane leaf hopper, *Perkinsiella saccharicida*. It must feed on a diseased plant when in the immature state, and once having got the virus into its body can go on spreading the disease for the rest of its life. The numbers of these insects have an effect on the rate of spread of the disease, which is the reason why it is always most severe and most difficult to control in areas where cane growth is lush and leaf-hopper population high.

The special design of Fiji resistance trials aims to provide an adequate amount of disease and a satisfactory population of hoppers for its spread from the diseased stools to the varieties under test. The disease is provided by planting nine-foot lengths of row with diseased setts of the variety Kassoer adjacent along the row to the 18–20 feet of row occupied by the varietal plots. The diseased plots are staggered across the rows so that they each adjoin portions of the neighbouring row occupied by a variety thus:—

Row—9ft. Kassoer, diseased; 18–20ft. variety; 9ft. Kassoer diseased.

Row—18–20ft. variety; 9ft. Kassoer diseased; 18–20ft. variety.

The variety Kassoer is used as a source of the disease since it has been found that that cane will survive and often produce a fair stool even from diseased setts or stubble. Other varieties invariably succumb to primary Fiji and so fail to provide a source of inoculum for the insects.

It is unusual to get sufficient spread of Fiji disease in a twelve months plant crop and the trials are invariably taken through to the first ratoons. Ratooning of the trial as a whole would deprive the hopper of any cover at a time when its population is at a low ebb and liable to further losses through the dry spring. Shelter must be provided during those critical months and this is done by including two non-experimental rows of cane every fifth and sixth row through the trial. This cane is left standing when the varietal rows are cut in August or September and the hoppers from the cut rows move into it. When the varietal rows have grown sufficiently, the other rows are cut and once again the hoppers move. The photograph

(Fig. 52) shows a trial in spring just as the varietal plots are coming away. The rows of harbourage cane are still standing and the diseased portions of the varietal rows are obviously slow to come away.

As mentioned above the reaction of new canes is evaluated in relationship to the standards, and it has been found that three, 12-sett plots will provide sufficient disease for valid comparison. A recent typical trial, for example, showed a range of from 0 to 68 per cent. diseased stools in the canes under test, while the standards showed from 6 to 66 per cent.

Ratoon Stunting Disease in South Africa

[We are in receipt of the 1955-56 Annual Report of the Experiment Station of the South African Sugar Association. This excellent report of the operations of the Experiment Station contains, *inter alia*, details of some investigational work on the effects of ratoon stunting disease on several of the varieties which are cultivated in that country. The extract reproduced below exemplifies the serious losses which can be caused by this disease, and highlights the urgent necessity to implement widescale control measures. It is apparent, from a study of the figures given, that the cane which was assumed to be healthy was, in fact, partly diseased, but this makes the yield gains from hot water treatment conservative.—ED.)

" Investigation into Growth Variation in a Field of N.Co.334.

The field in question was situated at Chaka's Kraal experimental farm, where it was noticed that there was a big variation between the height of stools of N.Co.334. The cane was growing on a shaly soil which in previous years had grown fairly even crops of cane, so it appeared unlikely that this unevenness was a soil condition. An examination of the cane indicated that ratoon stunting disease was present in the majority of the stunted stools. Consequently an experiment was planted when it was assumed that the stunted stools were diseased (D) and the taller ones were healthy (H). Both types of seed material were planted with and without the hot water treatment (HWT). The table shown below gives the results:—

From these results the benefit of the hot water treatment is self-evident. An inspection of the cane at harvest showed that the symptoms of the disease were present in both the H. Nil and D. Nil and absent from the H. and D. HWT treatments. It has been shown that the reason for the uneven growth in N.Co.334 at Chaka's Kraal is due to ratoon stunting disease and that the hot water treatment eliminates the disease, thus increasing the yield by over 50 per cent. It must be remembered that this is only the plant cane crop and a bigger loss can be expected in the subsequent crops."

Treatment	No. of sticks	Total weight in lb.	Tons cane per acre	Total length of cane in feet	Per cent. increase due to HWT
H. Nil ..	606	1,505	55	3,540	—
H. HWT ..	699	2,316	85	4,766	54
D. Nil ..	636	1,316	48	3,219	—
D. HWT ..	713	2,156	79	4,756	64

Fig. 53—Harvesting cane in the highlands of Abergowrie-Ingham District, 1956.

Fig. 54—Harvesting operations on the Meringa Sugar Experiment Station—1956 Season.

Fig. 55—The grab of the new Toft hydraulic cane loader. The grab is opened, closed and revolved by hydraulic rams.

Fig. 56—The Toft hydraulic cane loader. Note the hinged boom. All movements are hydraulically operated.

Fig. 57—The new seedling cane I.233. This is a rich land variety, highly resistant to lodging under flood or cyclone conditions.

Fig. 58—Meringa from Islay Hills. The Experiment Station is the group of buildings near the centre of this picture.

Fig. 59—Funnel ant mounds at the base of stools of mature second ratoon Pindar—Tully, 1956.

Fig. 60—Droopy-top stools, caused by copper deficiency, on very sandy soil at Mossman, 1956.

Sclerophthora Disease at Proserpine

By D. R. L. STEINDL

Minor outbreaks of *Sclerophthora* disease occur periodically in flooded areas throughout the Queensland cane belt; however, this year the heaviest infection ever recorded occurred on several farms in the Hamilton Plains area at Proserpine. Q.50 and Q.56 were most severely affected, with up to 60 per cent. of diseased stools in some patches. Pindar was also heavily infected and a few diseased stools were found in Q.63. The disease was concentrated particularly along the edges of the cane beds against the shallow drains.

Usually one or two diseased sticks were found in each infected stool, and these showed a characteristic "witches' broom" development from several buds along the stalk. Leaves showed the chlorotic striping and mottling which is typical of the disease.

The disease was also found in Para grass (*Brachiaria mutica*) and carpet grass (*Axanopus compressus*) which were growing very extensively on headlands and waste lands. Symptoms on these grasses were not obvious, and consisted of a faint mottling on the younger leaves. Microscopic examinations showed abundant development of oospores of the fungus in these leaves.

Fig. 61—Sclerophthora disease in Q.50 showing "witches' broom" development from buds along the stalk.

The affected area is poorly drained, and during the severe wet of 1956 was under water for long periods, which would provide ideal conditions for the spread of the disease. Over 117 inches of rain fell during the first six months of the year compared with an average of 53 inches for the same period in past years.

Complete control of the disease in areas subject to flooding is a difficult

problem since flood waters can carry the spores from grasses into low lying cane fields. However, planting material should not be taken from infected fields because the disease is readily transmitted through the sett, and if this practice is strictly adhered to the disease should never become a problem on land above flood level. Control on low lands will probably depend on the development of resistant varieties, and accordingly a trial which includes commercial varieties and advanced seedlings has been planted on a typical low lying area subject to the disease.

N.Co.310 in Mackay District

By A. A. MATTHEWS

[Another article on N.Co.310 in this issue states that, in Bundaberg, poor burns are experienced early in the season because of clinging trash and green foliage. The different experience in Bundaberg and Mackay is perhaps seasonal. A dry winter in Bundaberg will doubtless improve early burning qualities and a wet winter in Mackay will have the reverse effect.—EDITOR].

N.Co.310 is a variety which was raised in South Africa from the seed of the cross Co.421 x Co.312. It was later introduced to Queensland and the first planting in this district was made at the Mackay Experiment Station in August, 1947. It was later discovered that the variety was susceptible to ratoon stunting disease which was responsible for the variety's early mediocre performance.

Fortunately, the germination of N.Co.310 was unaffected by hot water treatment and the treated setts showed a marked improvement in growth. Propagation plots were established in the central area during 1953 and 1954. General distribution took place in 1955, and N.Co.310 was placed on the Approved Variety List for the 1956 planting.

N.Co.310 is a greyish, green cane which gives a good germination, rapid early vigour and a good compact stool. Cover is generally good, except where the crop is poor. The stalks are thin. The variety will give excellent ratoons, irrespective of when the crop is harvested. On the poorer lands in Mackay district, especially if conditions are unfavourable for ratooning, N.Co. 310 will produce a better crop than Q.50. This variety is more suited to the average to poor lands in the Mackay, Proserpine districts. Observations have shown that it is tolerant to wet conditions. On the better class soils the variety lodges.

Both maturity and mill tests over the last three years have shown that N.Co.310 possesses a good sugar content early in the season. Odd crops which were harvested in October had reasonable sugar, but the crops were light and did not compare with Q.50 and Q.58 cut at the same period.

Another good feature possessed by N.Co.310 is its ability to carry a good fire and give a clean burn early in the season. Mackay growers have had great difficulty in obtaining good burns early in the last two years.

A big disadvantage growers experience is the tightly clinging trash which slows down the rate of planting. This is an important factor as most growers are short of labour for this period. The variety arrows in early May, but all stalks are not arrowed and, on close examination, it is fairly common to see whole stools which have not arrowed. The early arrowing is not a very great drawback as the variety is harvested before excessive sideshooting and pithiness of stalk develops.

It is thought that because of N.Co. 310's ability to produce high sugar early on medium to poor lands there is justification for planting it on a small proportion of each farm.

"The Sugar Experiment Stations Acts 1900 to 1954"

LIST OF VARIETIES OF SUGAR CANE APPROVED FOR PLANTING, 1957.

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1957.

Mossman Mill Area.

Badila, Clark's Seedling, Comus, Pindar, P.O.J.2878, Q.44, Q.50, Q.57, Q.59, S.J.4, and Trojan.

Hambledon Mill Area.

Badila, Badila Seedling, Comus, Eros, Pindar, Q.50, Q.57, Q.59, and Trojan.

Mulgrave Mill Area.

Badila, Badila Seedling, Cato, Clark's Seedling, Comus, Eros, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, S.J.4, and Trojan.

Babinda Mill Area.

Badila, Badila Seedling, Clark's Seedling, Comus, Pindar, Q.44, Q.50, Q.57, Q.59, Trojan, and Vidar.

Goondi Mill Area.

Badila, Badila Seedling, Castor, Pindar, Q.44, Ragnar, Trojan, and Vidar.

South Johnstone Mill Area.

Badila, Badila Seedling, Clark's Seedling, Pindar, Q.44, Q.50, Q.57, Q.59, Trojan, and Vidar.

Mourilyan Mill Area.

Badila, Badila Seedling, Clark's Seedling, Pindar, Q.44, Q.50, Q.57, Q.59, Trojan, and Vidar.

Tully Mill Area.

Badila, Badila Seedling, Clark's Seedling, Eros, Pindar, Q.44, Q.50, Q.57, Q.59, Q.64, Trojan, and Vidar.

Victoria Mill Area.

Badila, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, and Q.50.

Macknade Mill Area

Badila, Eros, Luna, Pindar, Ragnar, Sirius, Trojan, and Q.50.

Invicta Mill Area.

North of Townsville.

Badila, Eros, Pindar, Q.50, Q.57, Ragnar, and Trojan.

South of Townsville.

Badila, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.16, and Trojan.

Inkerman District.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.2, S.J.16, and Trojan.

Pioneer Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Kalamia Mill Area.

Badila, B,208, Clark's Seedling, Comus, E.K.28, Pindar, Q.57, S.J.2, S.J.16, and Trojan.

Inkerman Mill Area.

Badila, B.208, Clark's Seedling, Comus, E.K.28, Pindar, Q.50, Q.57, S.J.2, S.J.16, and Trojan.

Proserpine Mill Area.

Badila, C.P.29/116, Comus, N.Co.310, Pindar, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Cattle Creek Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Racecourse Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Farleigh Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

North Eton Mill Area.

Badila, C.P.29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, S.J.2, and Trojan.

Marian Mill Area.

Badila, C.P. 29/116, Comus, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Pleystowe Mill Area.

Badila, C.P.29/116, Comus, E.K.28, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Plane Creek Mill Area.

C.P.29/116, Comus, E.K.28, M.1900 Seedling, N.Co.310, Pindar, P.O.J.2878, Q.28, Q.45, Q.50, Q.56, Q.58, and Trojan.

Qunaba Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.50, Q.55, Q.61, and Vesta.

Millaquin Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.55, Q.61, and Vesta.

Bingera Mill Area.

C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, Q.61, and Vesta.

Fairymead Mill Area.

C.P.29/116, Co.290, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, Q.61, and Vesta.

Gin Gin Mill Area.

C.P.29/116, Co.301, N.Co.310, Pindar, P.O.J.2878, Q.47, Q.49, Q.50, Q.55, Q.61, and Vesta.

Isis Mill Area.

C.P.29/116, N.Co.310, Pindar, P.O.J. 2878, Q.47, Q.49, Q.50, Q.51, Q.55, Q.61, and Vesta.

Maryborough Mi l Area.

C.P.29/116, Co.290, Co.301, Pindar, P.O.J.2878, Q.28, Q.47, Q.49, Q.50, Q.51, N.Co.310, and Vesta.

Moreton Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.47, Q.50, Q.61, and Vesta.

Rocky Point Mill Area.

C.P.29/116, N.Co.310, Pindar, Q.28, Q.47, Q.50, Trojan, and Vesta.

NORMAN J. KING,

Director of Sugar Experiment Stations.

Approved Fodder Canes

Bureau of Sugar Experiment Stations, Brisbane, 1st January, 1957.

All farmers are advised that the following are the varieties of cane which may be grown for fodder purposes in the sugar mill areas as set out below:—

Mossman, Hambledon, Mulgrave, Babinda, Goondi, South Johnstone, Mourilyan, Tully, Victoria, Macknade, Invicta, Pioneer, Kalamia, and Inkerman Mill Areas:

China, Uba, Co.290, "Improved Fodder Cane," and Co.301.

Proserpine, Cattle Creek, Racecourse, Farleigh, North Eton, Marian, Pleystowe, and Plane Creek Mill Areas:

China, Uba, "Improved Fodder Cane," and Co.301.

Qunaba, Millaquin, Bingera, Fairymead, Gin Gin, Isis, Maryborough, Moreton and Rocky Point Mill Areas:

China, 90 Stalk, "Improved Fodder Cane," C.S.R.1 (also known as E.G.), Co.301, and Q.60.

NORMAN J. KING,

Director of Sugar Experiment Stations.

Q.50 Ratoons in the Mackay District

By A. A. MATTHEWS and C. M. MCALEESE

The variety Q.50 is easily the leading cane in the Mackay district and figures published in the recent Annual Report of the Director of the Bureau show that it is the second cane in the Bundaberg and South region with 22.3 per cent. and fourth North of Townsville with 4.8 per cent. In 1955 it yielded a total of 2,600,844 tons to be Mackay farms and the situation will have to be carefully watched.

Poor ratoons have always been with us in one way or another, and it is only since the advent of the modern, vigorous hybrid canes that farmers have become accustomed to consistently reliable ratooning, year after year under a wide range of conditions.

Fig. 62—The Q.50 ratoons in the background are from July harvesting; the failure in the foreground is from September cutting.

an easy first in the State ahead of Pinday and Trojan, the only other canes to produce more than a million tons. It is obviously a most important cane by any standards and the mere suggestion that anything might happen to it would cause a pang of worry in the multitude of farmers who plant it even to the unwise exclusion of all other varieties.

It is not proposed to suggest here that there is anything radically wrong with the variety, or that its days as a profit earner on many farms are numbered; but poor ratoons, which could not be satisfactorily explained, have recently occurred on several

There is an analogy with the germinations, which in pre-mercurial days, were often very poor and uneconomical but were just accepted as an occupational hazard of growing sugar cane. Nowadays, a replant is rare and in nearly all cases, the farmer will admit freely that he himself was to blame. However—to get back to ratooning—if the farmer now expects a good ratoon, that is his right, and anything that prevents him getting a good ratoon should be investigated.

There is already under way an extensive programme of experimental work on the poor ratooning in the Bundaberg district, and it is possible

that the explanation of at least some types of poor ratooning there is very near to hand; but the most serious type of patchy ratoon failure at Bundaberg does not resemble the type which is now causing some concern on some Mackay farms. The latter is a very minor matter on a district-wide basis but, for individual farmers, some of whom are quite heavily hit, it is often serious. The authors have inspected instances such as that shown in Figure 62, where the Q.50 shown in the rear, cut in July, was perfectly normal, while the rest of the field, cut in September, was obviously away to a bad start. The crop was harvested in spring, 1956, when the good portion averaged 27 tons per acre and the poor only 10–12 tons. Other examples of poor ratoons, all on properties which are generally regarded as being very well farmed, included a block which dropped from 300 tons in the plant to 30 in the first ratoons, and another block which averaged 30 tons per acre in the plant and in the only section worth harvesting in the ratoons gave a shade over ten tons.

Crops on both new and old land are involved and at times the poor ratooning appears to be worse on the better soil in the block. There is usually no history of poor germination in the plant crop associated with the ratoon failures. Q.50 is the only variety affected and in some fields of mixed varieties, when that cane has failed, Q.58 and N.Co. 310 have ratooned satisfactorily.

Numerous stools have been dug in affected areas but the cause of the failure to shoot and root is not apparent. It has occurred in fields affected with red rot and that disease may have been a contributing factor in these instances, but it has been seen in many crops which showed no signs of red rot in the preceding standing cane. The possibility that a fungus and/or an insect is involved is under investigation.

Sterilizing Cane Knives for the Control of Ratoon Stunting Disease

Up to the present time the standard method recommended for the sterilization of cane knives contaminated with ratoon stunting disease is by heat, that is, by immersion in near boiling water or by burning. Whilst this method is cheap and simple, there may be occasions when it is not desirable to light a fire, and the use of some liquid disinfecting agent would be preferable.

A large number of experiments have been carried out with various disinfectants for sterilizing cane knives, and it has now been found that contaminated knives can be effectively sterilized by swabbing or scrubbing, until free from any obvious adhering matter, in solutions of 0.1 per cent. "Mirrol" or "Zephiran", 1 per cent. "Dettol", or 2 per cent. "Lysol", and then soaking in these solutions for a period of not less than one minute.

Cleaning of the knives by some form of scrubbing action is most important, otherwise the virus can be protected by the sugar and dirt which accumulates on the knife. It is also suggested that in practice the time of soaking be extended to about five minutes to ensure the maximum sterilizing effect.

D.R.L.S.

Ratoon Stunting Disease in Taiwan*

Subsequent to Eighth Congress of the International Society of Sugar Cane Technologists in the British West Indies, when Messrs. N. J. King and D. R. L. Steindl of the Queensland Bureau of Sugar Experiment Stations disclosed the existence in several countries of ratoon stunting disease and formulated the thesis of its relationship with varietal decline, Mr. T. T. Lo, pathologist of Taiwan, made a survey of crops in his country. On 76 plantations belonging to 26 factories he found, in 1954, that the percentages of diseased cane in commercial varieties were N.Co.310, 51.5 per cent.; F.108, 56.1 per cent.; and P.O.J.2883, 42.4 per cent. This was the first indication of the widespread nature of the disease in Taiwan.

To determine the effect of the disease on a range of varieties he designed a preliminary test whereby setts of ten varieties were divided into three lots and the following treatments applied:—

(1) Hot water treatment at 50° C. for two hours.

(2) Hot water treatment followed by inoculation with infected juice. Inoculation was performed by boring a hole in the internode and dropping in the infected juice.

(3) No treatment.

Each variety was planted in three rows 16 feet long and each treatment was replicated three times. At harvesting time the nodal symptoms of the disease were recorded and the following results were obtained.

The effect of hot water treatment in controlling ratoon stunting of sugar cane.

Treatments	(1)		(2)		(3)		Percentages of diseased stalks		
Varieties	No. of stalks	Number diseased	No. of stalks	Number diseased	No. of stalks	Number diseased	(1)	(2)	(3)
N.Co.310	632	2	632	20	490	123	0.32	4.70	75.10
F.108 ..	193	0	193	7	178	71	0	18.42	39.87
F.132 ..	273	0	273	6	361	95	0	7.59	26.32
P.O.J.2878	242	1	242	4	269	223	0.41	3.42	86.62
H.32-8560	228	0	303	25	275	107	0	11.52	38.92
COX ..	464	0	464	45	459	179	0	13.12	39.00
P.O.J.3016	194	1	194	12	287	78	0.51	7.90	27.18
P.O.J.2883	224	0	224	19	312	233	0	9.79	74.68
P.T.43-52	358	0	358	0	316	7	0	0	2.22
P.T.46-144	61	0	61	2	36	35	0	7.41	97.23

Comparative yields of ratoon stunting diseased stools and healthy ones in the first ratoon crop.

Varieties	Healthy stool kilograms	Diseased stool kilograms	Yield loss per cent.
P.T.46-144 ..	12.9	12.3	4.6
P.T.43-52 ..	8.44	6.18	26.8
P.O.J.2883 ..	4.63	3.37	27.2
N.Co.310 ..	11.83	9.35	21.0
P.O.J.3016 ..	10.7	8.65	19.2
F.134 ..	11.19	8.21	25.8
F.108 ..	6.21	5.67	8.7
H.32-8560 ..	5.26	4.45	15.4
COX	13.45	11.58	13.9
P.O.J.2878 ..	9.04	7.77	14.1

*Extracted from an article by T. T. Lo in Taiwan Sugar.

Mr. Lo comments that, from the above figures, it is apparent that practically all disease symptoms disappeared from the cane as a result of the hot water treatment; further, that the inoculation method was not very successful.

In the ratoon crop, in the following year, the yield was measured by weighing a single stool in each variety and each treatment. After weighing, the stalks were split lengthwise to assess whether the stools were healthy or diseased. The results obtained were as shown in the second table.

(Some criticism might be levelled at assessing yield losses on the basis of single stool weighings, but, no doubt, Mr. Lo will repeat this work, using large plots and the necessary replications.—ED.)

Mr. Lo goes on to state that germination of hot water treated setts varies from 50 to 96 per cent., depending on variety and planting conditions. He lists the requirements for reasonable germination as being—

(1) Seed-pieces must be dipped in a mercurial solution after treatment.
(2) Seed-pieces must not be covered with too much soil.
(3) Planting after treatment must not be unduly delayed.
(4) Soil should have good moisture content and be well drained.

Seed Bed Preparation

By J. WESDORP

Under the prolonged wet weather conditions which occurred during 1956 the preparation of a good seed-bed was often very difficult and there were many instances in the Burdekin district of land being worked in too wet a condition. The damage done in this way will take some time to rectify.

The preparation of a good seed-bed is mainly a matter of experience and a knowledge of the specific requirements of the particular crop. The general aim is the loosening up of the soil to provide the right conditions for germination and subsequent growth at a later stage. Sometimes the term "root-bed preparation" is used, and this more aptly describes the purpose of the soil preparation.

To be able to work the soil satisfactorily, its moisture content should be within a certain range. A soil with the desired moisture content will crumble up satisfactorily; it is friable, and feels soft to the touch. Power requirements for working the land are at a minimum and the ability to crumble guarantees that under the action of implements the soil will be left in a friable state in which there is enough moisture and air to satisfy the needs of the young emerging plant. Moisture and air in sufficient quantities are also necessary for the growth of micro-organisms, and this is of special importance where a green manure crop or other dead vegetable material has to be converted into humus. Such converted organic matter is helpful in bringing the soil to a good physical condition. Soil bacteria bring about chemical changes in the soil, as they can convert unavailable material into an available condition, suitable for uptake by plants.

The ideal seed-bed should contain sufficient moisture for germination of cane-plants even in the absence of further rainfall during the germination period. Very often during the process of land preparation little attention is paid to soil air, but the regulation of the soil air percentage by compression by rollers, or compaction devices behind planters, etc., is, very frequently, responsible for improved growth in the early stages of the crop. This compression by reducing air space brings more soil and thus more moisture to the immediate vicinity of the cane-setts. This is particularly the case where,

without compression, the small sett-roots would have exhausted the available moisture too soon.

The clods formed by working a soil when too wet are difficult to re-wet after drying out and consequently stay hard for some considerable time. Soil conditions are then not unlike those of very stony soils. It is obvious that the planting of cane setts amidst a mixture of clods will affect the strike, mainly through lack of moisture or, in other words, by too many large air-filled voids between clods. Any such damage is difficult to correct since, although sugarcane can stand quite an amount of such harsh treatment, subsequent tillage operations to break down the clods can do harm to young shoots.

With heavy clay soils, a good practice is to plough early and to let the soil lie for as long a period as possible before seed-bed preparation starts. This will enable natural processes of swelling and shrinking under subsequent rainfall to destroy the large clods, thus performing what tillage implements cannot do satisfactorily. This requires the first ploughing operation to be sufficiently deep so that subsequent drying out is satisfactory and does not take unduly long. Generally, the rougher the land is left after this operation the better, unless it is intended to plant a green manure crop for which a seed-bed has to be prepared. Sometimes, in this case, it is possible to strike a balance by preparing row-strips in which the green manure crop is planted, thereby endeavouring to leave the land in between the prepared rows untouched.

Green manure crops, particularly velvet beans, are of special value for these heavy soils. In the first place the added organic matter will help in bringing about the wanted good tilth; the leaf canopy will prevent disintegration of the clods to a hardpacked crust into which air and water have but little access. In the second place, a good green manure crop will help, through its uptake of soil moisture, to dry out the soil to a stage where it can be worked earlier than without such a crop. The value of a legume crop in providing nitrogen should not, of course, be overlooked.

In order to prepare these soils finally for planting it is essential to work when the right moisture conditions are present. It is at this stage that the changing soil conditions should be carefully watched and the grower should have everything in readiness to commence immediately the soil approaches a suitable state.

The very sandy soils lie at the other extreme. These of course can be worked while still rather wet without doing any apparent harm. Apart from the loosening up of the closely packed single grains the chief aim in the preparation of these soils is moisture conservation. Weed growth and green manure crops should be disced in as soon as practicable after the cessation of the wet season as this will not only prevent further moisture uptake, but the protective mulch of soil mixed with decaying organic matter will prevent, to some extent, evaporation of soil moisture. Green manure crops on sandy soils have an additional beneficial effect in that they are able to counteract to some degree the washing out of plant foods during heavy rain. As legumes are mainly deep-rooted their action has sometimes been compared with that of a pump, that is, keeping soil nutrients in circulation and pumping up these nutrients from lower levels and storing them at the surface in the green vegetable matter. When decomposed, the organic residue will form humus and will play a role in increasing the water holding capacity of these soils, which is always very poor.

Between the two extreme soil types, *i.e.*, the heavy clays and the very sandy soils, there are many other soils which occupy an intermediate position as far as their workability is concerned. However, the methods of soil management which have been discussed will also apply to these. In fact, careful attention to a few simple fundamental principles will ensure reasonable seed bed preparation in the majority of cultivated soils and under all but the most adverse weather conditions.

Mechanical Rock Pickers

By J. H. BUZACOTT

An article in a recent number of the journal "Taiwan Sugar" regarding the development of a mechanical rock-picker for use on sugar lands in Taiwan, leads one to conjecture as to why such implements are not used in Queensland cane fields. With the great extension in mechanical loading which has taken place in recent years small rocks are providing a serious problem for many mills crushing mechanically-loaded cane. This is reflected in the fact that in recent months some mills have imposed fines as high as £25 on farmers on account of rocks sent in with their cane.

Fig. 63—The Bestland Rock Picker on a Philippine plantation.

Mechanical rock-pickers are of two general types—those for handling large rocks weighing up to several hundred-weights and those which handle the smaller stones which range down to two or three inches in diameter. For the heavy rocks, machines of the crane type, resembling mobile grab cane loaders, are often used; however, the very large rocks do not get into cane deliveries and it is the picker for smaller stones which would have the greatest interest for Queensland growers. These machines are tractor drawn and constructed on the tilting rake principal with a hopper to carry the stones. The rake, which may be up to ten feet in width, is strongly constructed with tines like grubber tines spaced from one to three inches apart. The machine is dragged along so that the tines are pulled at a slight angle to the ground and with the points at a depth of a few inches below surface level. The rake is hinged and operated hydraulically so that when it has collected a load of stones the front end of the rake is lifted and the load discharged into a steel hopper. When full this hopper can in turn be hydraulically tipped in order that, with the minimum of labour, its contents may be discharged on a headland or waste space.

Fig. 64 is reprinted from "Taiwan Sugar" for May, 1956, and shows one of the rock pickers developed in that country in the process of discharging its loaded rake. Fig. 63 shows an American machine known as the "Bestland Rock Picker," which has been used to some

extent on sugar lands in the Philippine Islands. It is indeed interesting to note that in the September issue of the newly-launched Australian monthly "Country" a paragraph states that an Adelaide engineering firm is manufacturing a rock-picker under licence to a United States company. The illustration accompanying the reference in "Country" shows that this machine is similar to, if not identical with, the "Bestland" machine. It is claimed that the implement built in Adelaide can clear rocks up to 400 lb. in weight in an eight foot swathe at the rate of one to two acres an hour.

Fig. 64—A rock picker developed in Taiwan discharging rocks into the attached hopper.

Apart from the fact that a machine is apparently already available in Australia the skill of Queensland cane farmers in developing mechanical implements for specific purposes is well known. It should not be beyond the ability of many farmers to devise similar equipment to that depicted here and so, at the same time, both save themselves from heavy fines and earn the blessing of the millers.

Alternative Hosts of Ratoon Stunting Disease

Alternative hosts of ratoon stunting disease which have previously been reported in Queensland include maize, sorghum and sweet sudan grass. These plants did not show any obvious stunting due to the disease; however, a report from Cuba indicates that the disease will cause severe stunting in inoculated sorghum plants.

More recent work here has shown that a number of grasses commonly found growing in cane fields can be infected with ratoon stunting disease. These include the following:—

Para grass	*Brachiaria mutica*
Green summer grass	*Brachiaria miliiformis*
Rhodes grass	*Chloris gayana*
Green couch grass	*Cynadon dactylon*
Barnyard grass	*Echinochloa colonum*
Blady grass	*Imperata cylindrica*
Guinea grass	*Panicum maximum*
Red Natal grass	*Rhynchelytrum repens*
Wild sorghum	*Sorghum verticilliflorum*
Parramatta grass	*Sporobilus capensis*

None of these plants showed any characteristic symptoms as a result of inoculation but extracts from all of them produced the disease when inoculated into healthy Q.28 setts.

Fig. 65—Healthy sorghum plant in centre with ratoon stunting diseased plants—Cuba.

At the present stage it is not known if any of these grasses become infected in the field, nor if they could be of any importance in spreading the disease under field conditions. Further investigations on this subject are in progress.

D.R.L.S.

Comparison of the C.C.S. of Varieties Approved for the Bundaberg District

By R. B. MOLLER

The planting of approved varieties and promising seedlings under identical conditions on several district farms offered a unique opportunity to compare sugar content and relative maturity of the various varieties up to the time of harvest. Four trials were planted, but only two were suitable for sampling, mainly due to lodging of varieties. One trial selected was autumn plant cane grown on red brown volcanic soil and the other was spring plant on red forest soil. The plantings were made on 7/4/55 and 7/9/55 respectively.

Six stick composite samples were collected monthly from early July until harvest. Samples were divided into tops and butts and analysed independently. It must be remembered that the results obtained are small mill tests and are suitable only for comparison. Little reliability can be placed on the absolute figures obtained.

The results obtained for the autumn and spring plant crops are recorded in Tables I and II respectively. The c.c.s. figures for tops and butts are the figures actually recorded. The third figure for each variety is the mean of top and butt c.c.s. figures, and for the purpose of comparison may be regarded as the probable small mill test had the sample not been divided.

The overall lower figures obtained for the volcanic soil are a function of the soil and season. The unusually heavy and consistent rainfall during the 1956 growing season suited the volcanic soil generally and resulted in prolonged vigorous growth. In direct contrast frequent waterlogging of the forest soil under consideration considerably retarded growth.

The spring plant crop was harvested in early September and the autumn plant during the following month. This allowed an additional sampling and for this reason reference will be made primarily to the autumn plant results. It will be readily seen, however, that each variety performed similarly in both trials.

N.Co.310, Q.50 and Pindar are most frequently harvested early in the season and will therefore be considered together. Up to the time of the August sampling Pindar showed up most favourably, but the steep climb in c.c.s. made by N.Co.310 during August put it well ahead. It retained this position up to the time of harvest. Q.50 and Pindar were virtually the same at the September and October sampling. From Table II it can be seen that N.Co.310 was always well ahead of its nearest rival, Pindar.

Since a decreasing divergence of top and butt c.c.s. indicates that cane is maturing, it can be seen from Table I that both N.Co.310 and Q.50 were almost at peak maturity by early October. On the forest soil N.Co.310 was much more mature than the other two varieties at the September sampling.

Of the mid-season type canes Q.61 and I.70 are similar at the September and October samplings, and far superior to Q.49 and Q.55 in both cases. Q.47 approximates Q.61 and I.70 on the forest soil, but follows Q.49 and Q.55 more closely on the volcanic soil. At the October sampling there is nothing to choose between I.70, Q.61, Q.50 and Pindar. I.70 closely follows Q.50 and Pindar in maturity on the volcanic soil, but to a lesser extent on the forest soil.

Early harvesting of the trials prevented a proper assessment of C.P. 29/116, Vesta and P.O.J.2878 as late maturing varieties. From a comparison of respective top and butt figures it is quite obvious that Vesta and C.P.29/116 are much more mature than P.O.J.2878.

At this stage Vesta is 1.5 units higher than C.P.29/116. A study of the figures obtained for Q.55 shows that this variety fits more correctly into this category. This is at variance with general field practice in which Q.55 is harvested relatively early in the season with satisfactory results.

From the figures obtained it follows that N.Co.310 is the most satisfactory variety for early harvest. Q.50, Q.61, I.70, Q.47 and Q.55 in that order appear most suitable for mid-season with Vesta and C.P.29/116 as end of the season canes.

TABLE I

(Autumn Plant Cane) Volcanic Soil

Variety	Sampling Date			
	3/7/56	1/8/56	5/9/56	3/10/56
N.Co.310 Top	9.05	11.8	15.85	17.35
Butt	11.65	13.65	16.6	17.75
Average ..	10.35	12.7	16.2	17.55
Pindar	9.4	12.75	14.75	16.55
	12.85	14.55	15.65	17.10
	11.1	13.65	15.2	16.8
Q.50	8.15	11.4	14.7	16.7
	11.95	13.2	15.5	16.95
	10.05	12.3	15.1	16.8
Q.61	10.45	12.55	15.2	16.25
	11.9	13.55	16.35	17.3
	11.15	13.05	15.75	16.75
I.70	8.9	13.2	15.35	16.5
	12.35	14.3	16.05	16.95
	10.6	13.75	15.7	16.7
Q.47	9.4	10.45	13.25	14.6
	11.0	12.25	14.2	15.4
	10.2	11.35	13.7	15.0
Q.55	7.15	8.15	12.35	14.6
	11.45	11.30	14.8	15.85
	9.3	9.7	13.55	15.2
Q.49	7.2	8.9	13.0	14.8
	11.2	12.05	14.25	15.85
	9.2	10.45	13.6	15.3
Vesta	9.9	11.2	13.7	15.95
	12.1	13.25	14.8	16.85
	11.0	12.2	14.25	16.4
C.P.29/116	8.8	10.0	13.45	14.65
	11.15	12.25	14.9	15.1
	9.95	11.1	14.15	14.85
P.O.J.2878	6.3	9.15	13.05	14.8
	10.65	10.9	14.7	16.6
	8.45	10.0	13.85	15.7

TABLE II
(Spring Plant Cane) Forest Soil

Variety		Sampling Date 5/7/56	1/8/56	5/9/56
N.Co.310	Top	13.8	15.75	17.6
	Butt	15.75	16.9	18.1
	Average ..	14.75	16.3	17.85
Pindar		10.7	14.6	16.1
		12.8	15.25	17.0
		11.75	14.9	16.55
Q.50		9.1	12.45	15.35
		13.05	14.95	16.95
		11.05	13.7	16.15
Q.61		11.65	13.3	15.1
		13.6	14.65	16.7
		12.6	13.95	15.9
I.70		8.75	12.6	14.85
		14.1	14.25	16.75
		11.4	13.4	15.8
Q.47		9.6	13.2	15.1
		11.3	14.5	16.8
		10.45	13.85	15.95
Q.55		7.8	13.7	14.6
		13.7	15.85	16.05
		10.75	14.8	15.3
Q.49		9.4	12.15	13.65
		12.7	14.25	15.4
		11.05	13.2	14.5
Vesta		11.15	14.35	14.2
		14.8	14.95	15.6
		12.95	14.65	14.9
C.P.29/116		9.8	12.05	14.2
		12.2	14.6	15.2
		11.0	13.3	14.7
P.O.J.2878		8.45	12.75	14.15
		11.6	15.05	15.95
		10.0	13.85	15.05

Ratooning Troubles

Some publicity has been given in the past year or two to ratoon failures in the Bundaberg district where a range of varieties have mysteriously failed to produce normal ratoon shoots and roots. More recently similar occurrences have been recorded in Childers and Mackay although not necessarily from the same cause. Towards the end of the 1956 harvesting season several fields in Bundaberg which were ratooning badly were found to have larvae of the soldier fly associated with the stools which had failed to ratoon, and similar larvae have been forwarded from Mackay. It is not suggested at this early date in the investigations that the soldier fly is the responsible agent for the ratoon failures. Its presence may be quite coincidental, but it is an avenue of investigation which will be followed.

Ratoon Stunting and Other Diseases

WARNING REGARDING 1957 CANE PLANTINGS

Over the past few years, as the supply of healthy cane has become adequate to meet the full planting requirements in each mill area, several Proclamations have been gazetted which make it incumbent on growers in those areas to plant cane free from ratoon stunting and a number of other diseases. Some of the 1956 Proclamations were temporarily suspended during that year because the cyclone last March destroyed a large proportion of the clean stocks that had been reserved for planting. However, with a return to normal conditions, the terms of these Proclamations will be enforced during 1957, as also will those of a number of new Proclamations which, it is expected, will be gazetted early this year.

This means, then, that *early in* 1957, *all mill areas in Queensland will be subject to the provisions of one or other of the Proclamations,* and apart from their specific requirements in respect of chlorotic streak, leaf scald, mosaic, downy mildew, sclerospora, dwarf, Fiji and root diseases, they will all have the same requirement regarding measures to be taken against ratoon stunting disease.

Briefly, these Proclamations require:—

1. That all plantings of cane during 1957 and thereafter must be made from hot-water-treated material or from the uncontaminated progeny that originated from hot-water-treated cane.

2. That, except with the approval of the Director of Sugar Experiment Stations, all existing fields harvested annually, which were not planted from hot-water-treated cane, must be ploughed out after the second ratoon crops are harvested in 1957 or thereafter. Where this requirement might cause undue hardship, permits may be granted for the further ratooning of such untreated fields under special circumstances. In all cases where it is desired to continue growing these old diseased fields for a further period, applications stating full details of the current farming programme must be made in the first instance to the Officer-in-Charge of the nearest Sugar Experiment Station or to the local Senior Adviser in Cane Culture.

Because of the repeated warnings issued by the Bureau and by the various Cane Pest and Disease Control Boards, all growers should have had ample opportunity to have secured clean stocks, and by now they should be well placed to make their full plantings in 1957 from hot-water-treated material. The postponement of the gazettal of a number of Proclamations until 1957 and the suspension of others during 1956 should have provided additional breathing-time in which growers could set their houses in order by securing healthy stocks.

Several Proclamations are already operating smoothly in various mill areas, and in general it has been found that, regardless of whether Proclamations have been gazetted or not, the majority of growers have been keen to reduce the incidence of ratoon stunting and other diseases, and they have been co-operating wholeheartedly in planting healthy cane. However, should any grower still entertain doubts about the serious losses which ratoon stunting disease is capable of causing he should contact the local Bureau Officer. An inspection of the ratoons of some of the current disease trials should quickly convince anyone of the outstanding gains that are to be derived from the use of clean planting material.

Random Gleanings

In a recent overseas farming publication we were interested to see a photograph of a new thinning machine for sugar beets. It was impossible to overlook the similarity in design between this modern development and the spinner-weeder which used to be so common in Queensland cane fields. Our spinners were used to remove soil from the planting furrows, when too much cover was applied, and to weed the cane row at the same time; the ends of the spinner arms were shaped like flat spoons. Doubtless the beet thinner operates similarly, removing plants where germination has been too heavy. It is a new application of an old idea, but the beet growers describe it as "sensational".

The scale insect, *Aulacaspis madiunensis*, has been known for some years to occur on some cane crops in the Bundaberg and Mackay districts. It has been general practice to hot water treat any cane plants leaving those areas to kill the scale and prevent its introduction into other areas. A recent finding of the scale insect in the Herbert River district was the first known occurrence north of Mackay, and it has been identified as the same species. Although not a serious pest, it can cause stunting and low sugar content in certain varieties, particularly in standover cane.

Downy mildew disease, which we reported previously as having been found once more in Bundaberg early this year, has been confined to the one farm. Altogether, 136 stools were dug from six blocks of cane, and the lack of spread to other farms was doubtless helped by the presence of buffer areas of the virtually immune C.P.29/116 which is so extensively grown. The more heavily infected blocks were destroyed as soon as the outbreak was detected, and the others were harvested early in the season to allow inspections of young ratoons to be made before climatic conditions were suitable for spread of the disease. No planting material will be taken from the crops on the farm and it is hoped that these measures will lead to early and complete eradication.

Mr. G. C. Bieske, Soils Chemist, will take up duty early in the New Year at the newly erected laboratory at Mackay Sugar Experiment Station. Soil samples from canegrowers in the Mackay district and adjacent areas will, from that date, be analysed in the new laboratory and this will ensure fertilizer recommendations being forwarded to growers with a minimum of delay. The stationing of a soil chemist in the area will also enable follow-up work to be performed; growers can be contacted regarding the results of their fertilizer applications and any problems investigated on the spot.

The South African raw sugar production for 1955-56 amounted to 938,980 short tons, an increase of 76 per cent. on the 1951-52 output. This is a remarkable rate of increase in four years. During the same period the tonnage of cane per acre rose from 23.3 to 31.8, while the acres harvested went from 206,000 to 252,000. It is obvious that the rise in production was not all due to extra area. South Africa has a rapidly increasing local market for sugar, and further expansion on an appreciable scale appears certain.

We have previously mentioned in these columns the aerial survey of cane lands in Natal. In the South African Sugar Journal for August, 1956, it is stated that some 500,000 acres have already been photographed and mapped and that 52 per cent. of the growers, whose lands are included, have purchased maps of their properties at a charge of 9d. per acre. It is expected that the survey will be completed soon after the end of 1956.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

The Bureau laboratories in Brisbane will post to any cane grower sufficient fresh culture to inoculate seed of cowpeas, velvet beans, mung beans or other types being grown. Instructions for use of the culture will be enclosed. Address your request to The Director, Bureau of Sugar Experiment Stations, Brisbane, *but allow at least a week, after receipt of your letter, for the culture to be prepared and posted.*

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.